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MAP READING

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THE introductory quotation in a recent number of this Journal[1] emphasized the study of maps. It is worth reviewing.

"In geography we are constantly using maps; and upon them must be based a necessarily large part of our work in geography. So proper education in geography must include a careful training in the making and interpretation of maps. More and more a map is coming to be a shorthand representation of a mass of geographical information, and more than ever a good geographer is able to read a chapter from a map. A pupil needs to learn the language of maps, then to memorize some of the essays and sketches set forth in the map's language. To do this is an exercise of attention and retention, and, studied in this way, the continents become as easy as so many letters in the alphabet—learned once, learned forever." We are slowly outgrowing the practice that involved the learning of a long list of unrelated names of capitals of states or countries, names of rivers and mountains, bays, capes and the like. Many teachers may insist that the old order has entirely passed away, nevertheless, it is essentially and persistently retained in much of the teaching, especially when the subject matter of instruction concerns lands other than our own. The misuse or too frequent use of the text book makes the teaching forced and uninteresting. The development of home geography within recent years enables us to take a long stride forward. The study of home geography should not be confined to the limits of any one or two grades but by constant field exercises it should be made to enrich all the later work in the subject. Many studies have to be cut into portions to suit the mental capacity of the pupils of the different grades. In this way, the continuity of a subject is apt to be broken. If the home geography is relegated to a certain grade, and if in a succeeding grade the study of one of the grand divisions, as Eurasia, occupies all of the time to the

[1] J. P. Goode, Jour. of Geog. III, 2, opp. p. 35.

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neglect of out-door observation, the work must largely be done in the old way and without much aid from home geography. The pupil will not be in intimate touch with the subject as presented in earlier grades, and little use is made of the instruction of these grades. Yet a study of Eurasia can hardly be considered anything but visionary, if the concepts gained from the study of home geography are slightingly considered. The object of the insistence upon the study of types has this thing in view, namely, to furnish the mind with some units of measurement which are to be the standards for future judgments. Such articles as "A Temporary Sahara"[1] probably finds its inspiration in this idea. Some work of this nature is done, as for instance, the determination of the rainfall under the control of wind direction and topography. In most cases, however, the rational treatment is incidental, and forms no part of the working plan. The opportunity for an increase of the rational or development plan is obvious. With a wealth of data derived from the study of home conditions many features of another country may be approximated in vision. Such work will mean a distinct gain in clearness and accuracy of thought because of the foundation on which it is built. Not to apply the lessons of the home study to other lands is to isolate, make fictitious, the distant places. The present paper is a continuation of a previous article by the author[2] and an elaboration of a scheme of map work that has stood the test of trial. The outline of this article is not a course to be followed as narrated. It is rather a somewhat severe expression of an idea that should yield suggestions for the different stages of the work of map reading. In each case the application of the principles of home study is the agent. If each of the grand divisions is studied with some reference to a plan of this nature, the repetition involved will be found to be excellent drill work.

The maps which accompany this paper are ten in number and are briefly catalogued as follows:

1. Outline map, with parallels and meridians. The map may be on any projection. However, it is advisable to shun the Mercator projection and its modifications for the sake of emphasis on direction, and in order that early practice may be gained in treating north and south directions as coincident with meridians, and east and west with parallels.
2. Topographic map, showing three degrees of elevation.
3. Wind chart for July.
4. Wind chart for January. These wind charts mark the average extreme of the seasons and the average limits of the migration of the wind belts.

[1] Jour. of School Geog. IV, 171.
[2] Map Making and Map Reading. Jour. of Geog. III, 65.

5. Rainfall map.

6. Soil map. Under this head is included minerals. This map offers a great variety of materials from which to choose. Its use must depend more largely than the preceding maps upon individual conditions of mind and time. Here it will be employed very fully, if indeed, its use is not carried too far.

7. Map of vegetation. This map may also be expanded according to

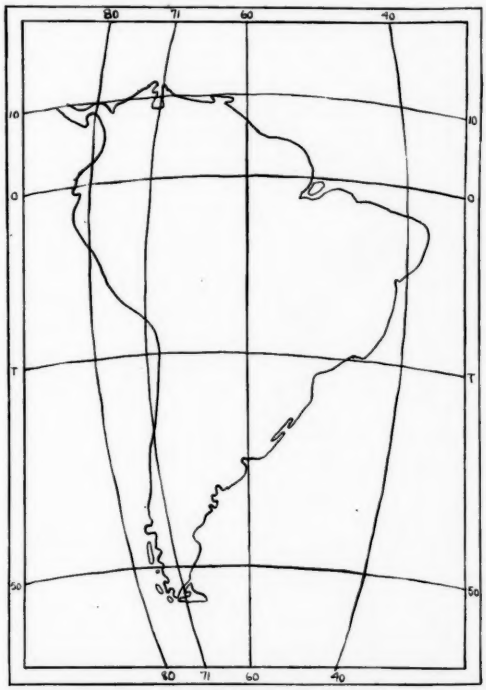

Fig. I. Outline map.

desire. Maps of different products may be used. In this instance the map shows the degrees of luxuriance rather than kinds of vegetation.

8. Map of Animals, showing the range of domestic animals.

9. Map of Commerce. A map of degrees of commercial development and indicating future possibilities in this direction, with important railroads and sailing routes.

10. Map of Population, showing density.

These maps may be made easily from a stencil or by sketching upon heavy paper, and mounted for wall use. If a crayon pencil is used for drawing the lines and for coloring the maps they may be read in all parts of a school room. A legend should be added to each map and care should be taken to make this legend as legible as the map itself.

The Specific case. South America.

1. Given an outline map (Fig. I) of South America, with the parallels

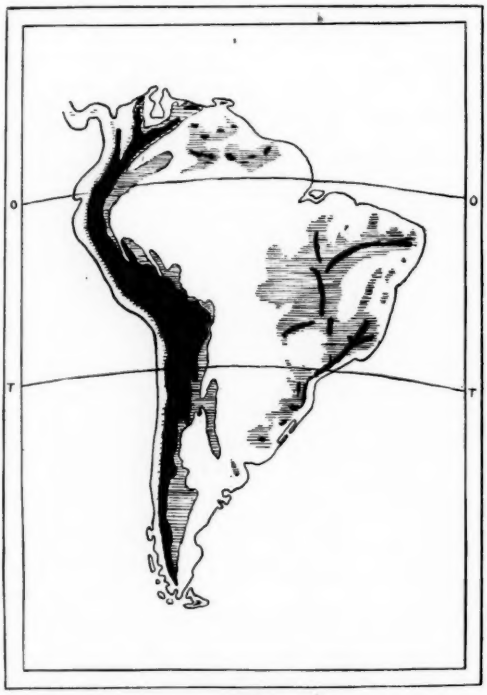

Fig. II. Topography map. ■ Highlands, above 2000 feet. ▒ Uplands. □ Lowlands. (After Redway and Hinman).

and the meridians. The position of the country may be decided. As an aid to the location the meridian of the home, in this case, Worcester, approximately 71 degrees west longitude, may be entered on the map. The proportion of South America to the east of this meridian is noted and the fact furnishes a basis for a few simple problems in longitude and time. When it is noon in Worcester (75th meridian time), what is the time (local) at Cape St. Roque? The parallels may be used: A. In reference

to location. What portion of South America is within the tropics? What place in North America corresponds in latitude with the southern extremity of South America? B. In reference to the position of the sun. At noon on the days of the equinoxes what is the position of the sun to an observer at the southern extremity of the country? On the day of the summer solstice? On the day of the winter solstice? C. In reference to climate. The consideration is merely latitudinal control or sun insolation. The statements

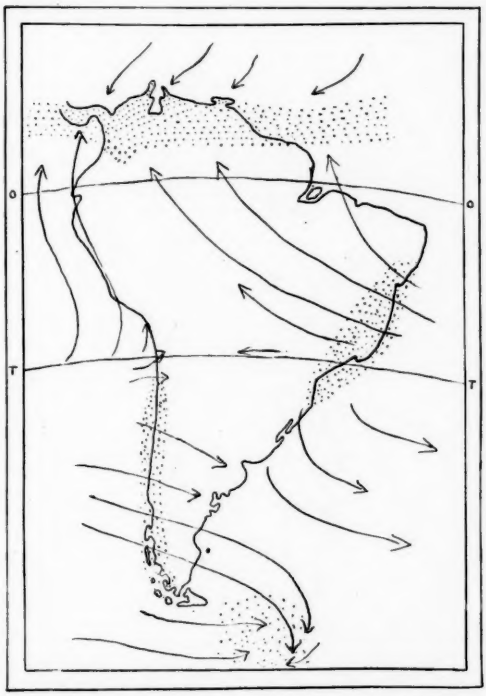

Fig. III. Wind map for July. Arrows fly with the wind. Dotted areas show ascending currents. (After Davis).

must be very general and be of such a nature that a modification under the other climatic controls can be made easily and without a sense of the futility of the general statement. Here also may be emphasized the large percentage of the country under the direct rays of the sun in sharp contrast with North America.

A journey in fact or fancy taken along a meridian in North America discloses the idea of increasing luxuriance of vegetation as one goes south-

ward and a diminishing amount as one journeys to the north. Thus low latitudes may be inferred to foster the luxuriant growths and high latitudes a lesser and lesser amount. A first general consideration along this line paves the way to a fundamental conception of the vegetation of South America. So in like manner a heavier rainfall may be expected in the low latitudes than in the places more distant from the equator.

From the outline of the country two questions are suggested. The first

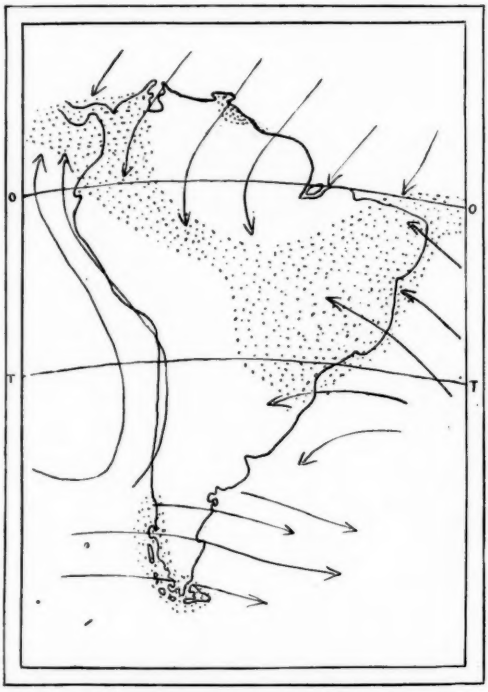

Fig. IV. Wind map for January. Arrows fly with the wind. Dotted areas show ascending currents. (After Davis).

has to do with harbors, population and commerce. The very limited harborage of the western coast and the few along the Atlantic coast may mean little commerce, or the concentration of commerce at few localities. Under the latter consideration the commerce is light or congested. A statement left undecided or an alternative to be settled by subsequent knowledge, with judicious handling, often incites the pupil to an eager anticipation of future lessons. A second question arises concerning the southwestern coast

line. A likeness to the irregular coast line of Maine is suggested, and a similarity of origin may be inferred.

2. Add to the data of map I, the topographical map (Fig. II). The study of the home conditions has shown the effect of altitude upon climate. We may now strengthen certain points left in suspense while studying map I. The continually changing aspect of the work may seem at first glance an

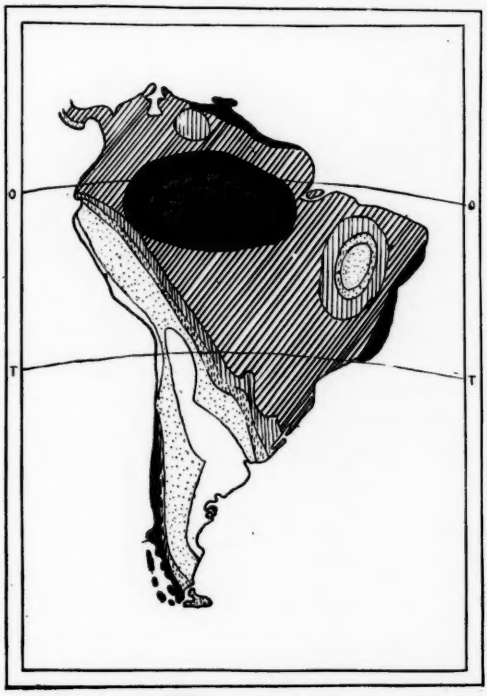

Fig. V. Rainfall map. ■ Over 80 in. //// Over 40 in. ▥ Over 30 in. ıılıılıı Over 20 in. ▭ Under 10 in. (After Mill). :::: Over 10 in.

objection to the scheme, but it is nothing more than the evolutionary process experienced in all our growth. To present South America with all its features, topography, drainage, wind, rainfall and culture, is to confuse with the multiplicity of new ideas. The advantage in a developing set of maps of a continent is not alone the emphasis on special features, but better still the interdependence of physical conditions and the consequent modification of the different controls which shape the continental life.

The very general statement concerning climate obtained from the consideration of latitude circles may now be modified. The height of the Andes, and of the Brazilian and Guiana highlands in the equatorial regions suggest a more temperate climate in those parts, while the culminating portions of these ranges of mountains may be thought of as having a cold cli-

Fig. VI. Soil and Mineral map. ▭ Recent alluvium. ooo Diluvium.
:::: Sand. ═══ Loam and Loess. Diamond. • Iron.
+ Gold. C Silver.

mate. The change from the highest equatorial Andes to the Southern Andean heights may be paralleled in kind in North America.

If any connection has been made between altitude and rainfall an approximation of the conditions of rainfall may be attempted, and even the wind charts will introduce a new feature. The vegetation is now confined to a smaller area inasmuch as the highest portions of the mountains, like high latitudes, are not localities of much vegetation.

It is necessary to step aside at this point to show that inasmuch as vegetation depends largely on rainfall and since the rainfall has been considered, the statement for vegetation might be further modified. Such a step, however, would defeat the purpose in view. The map under consideration, the topographic map, is to be followed and the modifications due to topography considered. The rainfall was discussed from the standpoint of altitude and

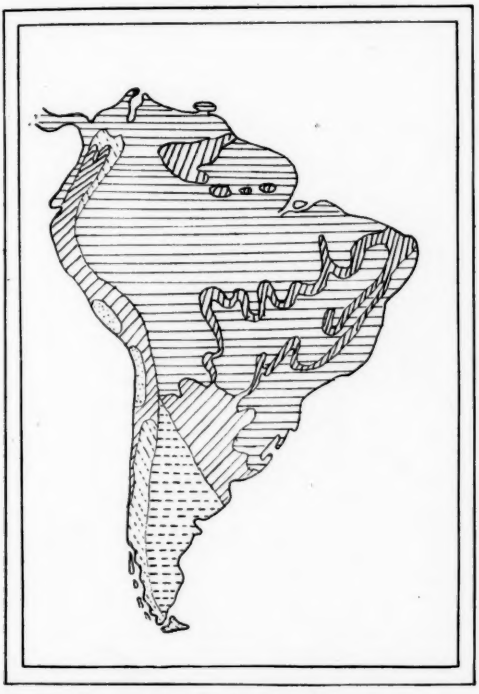

Fig. VII. Vegetation map. Chief condition of vegetation.
Tropical and Subtropical. //// Grassy plains. ═══ Forest and Cultivable lands.
Temperate. ′,′,′ Prevailing fir and pine trees. ═══ Grassland cultivable. Part needs irrigation.
·::: Desert Regions. (After Adams).

the vegetation must be considered in like manner. To discuss the vegetation from the viewpoint of the rainfall hypothecated from the topographical map is to base our reasoning on a portion of the truth and not the entire truth. Such a step would be dangerous.

The division of South America by the Andes into a narrow western por-

tion and a broader eastern portion offers some basis for the consideration of the distribution of population. In this instance as in the others the plan is to gain our conclusion from the discussion of the map in hand and the previous data, independent of what may be the final decision when all the data is at hand. In a way an analysis of the controls is made. Whereas it is not only possible but most convenient for population to collect in spots favored by harborage and open by easy journeys to large areas, yet when the

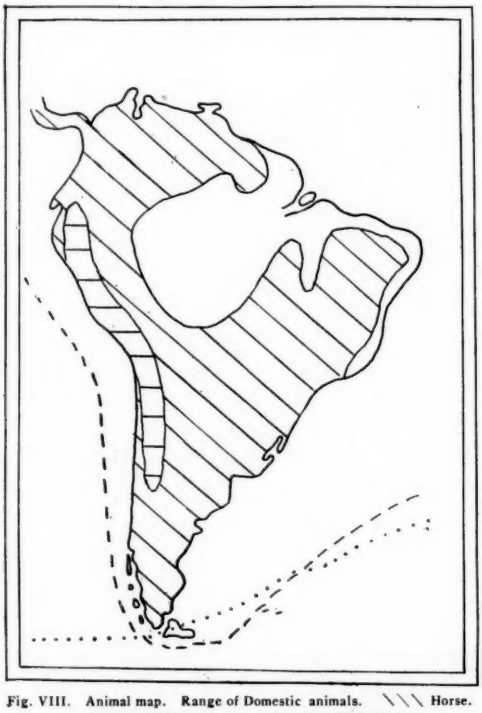

Fig. VIII. Animal map. Range of Domestic animals. \\\ Horse.
=== Llama and Alpaca. — — Southern limit of sheep.
• • • • Southern limit of cattle. (After Adams).

last thing has been said it will be found that the gratification of the desires of mankind may dictate a habitation in localities in spite of their many disqualifying physical features. It is claimed that a weighing of the convenient and the usual will bring into strong relief man's departure from easy paths when such cases are discovered. We may note in passing that the presence of the mountains in the southern part of the grand division may strengthen

the contention in regard to glaciation deduced from the irregular southwestern coast line.

3. To the data already presented add the wind maps (Figs. III and IV), showing the distribution of the winds for January and July.

The process of elimination and reasoning continues. Where the winds blow from water over the land the expectation is a modified climate. If the wind strikes against a mountain slope and is forced to rise rainfall results.

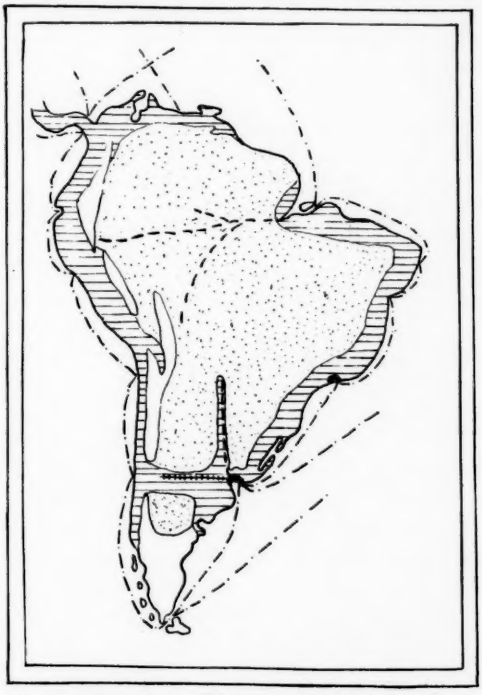

Fig. IX. Commercial map. ☐ Deserts or unproductive regions. ∴∴∴ Regions commercially undeveloped. ═══ Regions of important commerce. ■ Regions of largest commerce. (After Adams).
—— · —— · —— Steamer lines. ——— ——— Rivers navigable for river steamers. ┼┼┼┼┼ Railroad.

The winds that blow across the country without coming in contact with great slopes carry with them more moderate conditions, so that it is the experience that climates otherwise oppressive because of the latitudinal and topographic controls, become more bearable. The ascending air columns are regions of low barometer because of the increment of motion upwards.

As the ascending air column, because of cooling, increases in relative humidity rain is the usual result. Where the prevailing wind blows from water across the land a region of continual rainfall is the experience. If two regions as in southern Chile and Guiana, in different latitudes, are under this control, it may be expected that the latitudinal control will yield the de-

Fig. X. Population map. Density of population. ☐ Less than 1 per sq. mile. :::: 1-25 per sq. mile. ═ 25-125 per sq. mile. ■ 125-500 per sq. mile. ● Cities of over 100,000. (After Tarr and McMurry).

cision as to which shall have the greater quantity of rainfall. On the other hand when the winds blow over the land, or from the land to the water the conditions for aridity are obtained. Thus we may approximately locate the Atacama desert region. Furthermore, if the mountains are high enough to intercept a prevailing wind the leeward side of the range will in all probability be under varying degrees of aridity, as is the case with much of Argentina. A comparison of the two maps, III and IV, easily leads one to see the migration belts. The South American country may be divided into two

regions, one under a prevailing wind throughout the year and the other under one wind for a part of the year and under another for the remainder of the year. The seasons under the influence of this migration may be much more nearly approximated from a diagrammatic chart of wind direction than from the sweeping statement that South America has "a wet and dry season." The process of acquiring this idea is the educational function which far outweighs in value the crude fact. The rational process is too often missing from a geography lesson; it is easier to cram with data which are asserted as true, than to labor through a process of reasoning, especially if the teacher is not quite sure that the reasoning process will not contradict her list of facts, which are her eternal verities.

4. The data has so accumulated that a very near approach to a rainfall map may be drawn. The map (Fig. V) is the next one to be presented and the variations from the anticipated may be noted and perhaps considered. Many queries arise. In regard to vegetation: Where are the localities of luxuriant growth? of more comfortable growth? of scanty vegetation? The conditions of living in regions of luxuriant vegetation are so marked that a discussion will lead to the density and to some degree to the state of civilization.

Nothing has been said up to this time about rivers. Rivers as the carvers, to a large degree, of land forms would perhaps naturally precede the consideration of topography. For the needs of this discussion the logical historical order cannot be followed. In the earlier years of instruction we must study the land surface as we find it. So with the topography and the rainfall a consideration of rivers is possible. It will be obvious to the pupils that on the western slopes the streams must be short and in the region of the drying winds a scarcity of rivers may be expected. The larger rivers of the eastern continental slope and the smaller streams of the secondary highlands follow as a natural consequence. The more arid regions of Argentina will furnish the cue to the rivers of that locality. The ordinary physical wall map, showing the rivers may now be presented for verification.

5. Enough data have been given so that the remaining maps may be constructed, and the true map displayed at the end of the exercise rather than at the beginning. The reasons for the errors in the constructed map may serve as a quest which will reveal new information. So we are to construct the soil map. From the topography and rivers locate the alluvial lands. From the wind charts locate the sandy regions. From the winds and rainfall locate loess. From the rainfall map locate salt. From the outline and topography locate diluvium. Under the soil map is included minerals. There may be added by conventional signs as large a variety of these

as suits the individual judgment. There is some connection between mountains and mining so that a first statement might locate the possible localities for minerals from the topographical map. The soil map (Fig. VI) may now be displayed and the deductions verified.

6. The topography, rainfall and soil maps have already furnished considerable data for the discussion of vegetation. If the result is expressed upon a map and then the vegetation map (Fig. VII) (showing luxuriance) is displayed and the same process of comparison used, the experiment should yield something of value.

Another side of the vegetation story may be introduced. If for instance we know the conditions under which rice grows, then the rice yielding portions of South America may be considered. On the other hand, the story may be approached from the following point of view: Rice requires 60 to 80 degrees for ripening and is grown on irrigable land. What localities in South America satisfy the above conditions? After a decision is reached the facts in the case should be made known. The judgment may be faulty because there has been an error in the pupil's mind concerning the climate; because the land has been given over to another product; because of the unsettled condition of the government; or for some other cause discoverable or otherwise. So in like manner a number of staples may be used. Sugar cane requires rich, moist soil, practically no frost, even in winter, prefers the vicinity of the sea. Cotton requires a long warm summer, some rain, rather fertile soil. Wheat requires a mean summer temperature of 57 degrees, plenty of sun. This list may be expanded easily.

7. It is not easy to locate within limits native animals because of the migratory habits. At the same time certain definite conditions control much of the animal life. The influence of man is so marked upon this life that he must be counted the most important modifying influence. In a way the native animal life may be approached in the same fashion as the vegetable life. In many cases one of the requirements will be the absence of civilization. The vegetation, the soil, the topography and the climate furnish a starting point. The home study may yield a basal notion which, though crude, is acceptable as perhaps one of the best available. The life of a swamp is known to differ from the soil of a hillside. The swamp life is apt to be largely reptilian. If trees abound in a large swamp any life not of the swamp itself must be arboreal. So we question what sort of life may be expected on the plains, in the forest tracts and on the mountain heights.

Following the same method used under vegetation, certain type species may be selected and their conditions of living noted. Similar conditions may

be found in the country studied. The text-book may properly be used for correction when the conclusions have been drawn.

For the domesticated animals the process is a little more definite. Grazing is often carried on in uplands, among mountains and on plains where the rainfall is insufficient for agriculture. Certain localities in South America may be selected as suitable for grazing. It is not supposable that the truth will be reached from a reasoning process at every stage. The object in each step is twofold. In this instance, if we are sure of the right conditions under which grazing thrives then the discussion puts upon trial the previous judgment concerning climate, topography, etc., while there has been located the grazing regions through the same processes that caused them to develop.

8. Commerce and population are interrelated to such an extent that it is not easy to place one before the other in discussion. The decision in this paper is to consider the commercial map before the map of population, although one implies the other, and finally to sum up under both the topics that are not easily separated. The regions of densest commerce and the regions of commercial possibilities may be approximated and a very near approach to a commercial map constructed. What statements concerning commerce could be made from a study of a soil map? How would a study of the rainfall map modify these statements? Would the topographic map give any hint concerning commerce? How far might the outline map indicate centers of commercial activity? Under what conditions and where in South America do the outline and the winds hinder commercial development? Under what conditions and where is it aided by these controls? Questions which relate to vegetation and animal life may follow and then later the commercial map (Fig. VIII) may be presented and considered.

In any discussion of population, the consideration is based on the desires of mankind and presupposes that people will live where there is something to live for more or less independent of risks. It may assume a slight knowledge of the climatic effects upon life. Why were the native mountain tribes—the Incas—more highly developed than the valley tribes—the Caribs, for instance? What effects will climate (the resultant of the first four maps), have upon the state of civilization? How far will any one map, as the soil map, explain the Spanish conquest? The commercial map is almost the population map. The outline map may aid in locating cities.

The centers of population and commerce, the cities, may now be considered. Explain Rio Janeiro. Using each of the preceding maps does any one or ones above the others indicate a reason for its growth? Work out a similar scheme for Buenos Aires. Iquique offers a new situation. The

outline map suggests nothing and the winds are not favorable to the location of a city at this place. There is the conclusion that places may develop in spite of harborage and in the face of unfavorable winds.

The above plan of map reading is carried out in detail under some headings while under others suggestions only are made. There is scarcely a limit to the expansion of such an idea. In part the article will offer nothing new. The study of maps and the extent of map work is largely the outcome of the individual decision of the teacher. It cannot be done safely by a teacher who approaches the task in uncertainty. Much more than is here presented may be done by a teacher sure of her steps and careful of her decisions. Some of it should certainly be woven here and there into the study of the grand divisions.

FIELD WORK IN GEOGRAPHY

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THESE trips by classes of the Springfield, Mass., schools have been found very attractive and profitable. No attempt is here made to designate the schools that took the trips.

A ninth grade class walked a mile or more after school one day to the Connecticut River. There was an unusual amount of snow on the ground and the ice was just beginning to soften. Everything indicated a freshet in a few days. The pupils observed the conditions and got all the preliminary data for a study of the annual rush of water. For several days the newspapers were watched to learn of the progress of the river and a new interest was awakened. Unfortunately for this study the snow melted gradually and the river never made so little fuss over its spring duty.

At another season a ninth grade left the school at 3 o'clock. The street railway allowed half fare so the class of forty pupils went to the lower end of the city. The river had begun to drop from its high water mark. A special study was made of the muddy current and of deposit. Fertile fields along the river were shown as a result of this deposit. A long bridge over the river at this point offered a fine opportunity for observation. This trip took about two hours and cost five cents apiece.

One Saturday in June the class of eighty or more had a geographical picnic. A ride of twelve miles on the electrics brought us to the foot of a range of hills known as the Wilbraham Mountains. The walk from there up to the top of the range, 900 feet high, was merry with the joy of being out in the free country. The day was spent in a large grove of chestnut trees. A great variety of flowers were picked and the woods were thor-

oughly explored. The search for a spring for drinking purposes revealed many facts about drainage. The chief purpose of this trip was to show the pupils the broad expanse of the Connecticut Valley and to make real to them high and low land. It was also noticeable that the soil upon the heights was very thin and full of ledges while that about our homes is sandy. A ridge of trap rock that cuts across the valley above Holyoke was clearly seen. Perhaps the best lesson of the day was the very strong wind that blew up from the valley all day. This was to strong that the lunch had to be eaten in a sheltered place. When the descent into the valley was made a quiet condition of the atmosphere was found. This was a great day for the children. The expense was twenty cents apiece. Contour maps of the section were taken along.

Trolley rides by different schools are common here. Often the object is simply for pleasure but usually there is a definite object in view. A very efficient system of electrics makes it possible to go all over the valley and view at little cost many points of geographical value. The most ambitious trip of this sort has been made yearly for three years by seventh grade pupils from three different schools. The trip is thirty-three miles in length and is full of historical and geographical interest. Two large cars are filled. The principal of one of the schools has charge of a car, an appointed monitor is at the outside end of the seat and every other detail is carefully worked out beforehand. A start is made from the city at eight o'clock. After crossing the river two or three times the party halts for dinner at the foot of Sugarloaf Mountain, a sandstone bluff. The lunch has been brought by the children in boxes. A wait is made here long enough to allow all to climb the mountain and get a good view of the river and country. The rest of the trip is of historical interest chiefly. Old Deerfield, famous in Indian wars, is thoroughly inspected just at a time in the lives of the children when it means the most. A total ride of sixty-six miles on the electrics and the care of the large crowds of children is a feat that most of us shrink from. But it has been done for three years without a mishap and seems to have become a fixed thing in the school program. The cost to the children is fifty cents.

Attempts have been made to have an excursion down the river to salt water. This means a trip on the steam cars and on a boat but as yet the transportation rates are prohibitive.

A map is the best and most accurate means of expressing certain geographic facts. Children should learn to read a map as readily as a newspaper, that they may use maps intelligently in later years.

ILLUSTRATION OF TIDES BY WAVES

BY W. M. DAVIS
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SEVERAL years ago I contributed an article to this JOURNAL on the relations of "Waves and Tides" (Vol. II, 1898, p. 122-132).[1] A return is now made to the same subject in order to suggest a method of illustrating the phenomena of tides by the movements as waves, as they are seen on an irregular coast, such as that of New England.

Figure 1 represents a small cove, 100 or more feet in length and 30 or 40 in breadth, enclosed by rocky walls, with a pebbly or sandy beach at its head. A wave of moderate size, not the result of local wind, but of a storm perhaps hundreds of miles away, is sweeping into the cove. The period of the waves may be from 5 to 8 seconds. A wave crest is seen at F, a wave trough at D, another crest at B. The movement of the water in the different parts of the wave is recognized by the movement of floating bodies or of seaweed; and thus one may easily detect the difference between wave progress, persistently in one direction at a relatively high speed, and orbital wave motion, back and forth, up and down, at small speed. Arrows at the wave crests, F and B, show the water there is moving towards the cove head, while in the wave trough, D, it is moving from the cove head. The orbits are dotted at F, D, and B, and should be imagined as standing in vertical planes (not as lying on the water surface). The increase in the size of the orbital movement toward the head of the cove may be easily noticed. At a point on the front of the wave, as at C, the water is for a moment rising without forward or backward motion; at a point on the back of a wave, as at E or A, the water is for the moment sinking, without forward or backward motion.

The condition of things a few seconds—half a wave period—later is shown in figure 2, when crest and trough have changed places, and with this all the orbital motions are rearranged. The beach is now flooded with the advancing wave, while a few seconds before it was laid bare.

While these phenomena are considered in their actual relations, as waves, they should be examined in three ways. First, a single wave should be followed as its flat crest comes into the cove, advances towards its head, and swashes up the little beach; thus the progress of the wave up the cove is clearly seen. Second, the water at a single point should be closely observed, as at B, where a small float may be placed; thus the orbital movement of the

[1]Errata in the previous article: p. 129, 8th line from bottom, for "rise and fall." read "rise than fall."

water in the passing waves becomes clear. Third, and most instructive in the present connection, the changes in the height and movement of the water at a single point on the shore should be watched; for thus the phenomena ordinarily associated with tides will be seen in miniature. At H, for example, the water in Figure 1 stands high, with a movement to the right; while in Figure 2 the water at the same point stands low, with a movement to the left. These features are best seen in calm weather, when the incoming swell makes a wave that has a rise of not more than two or three inches, with a period of six or eight seconds. Then the orbital movement will be of

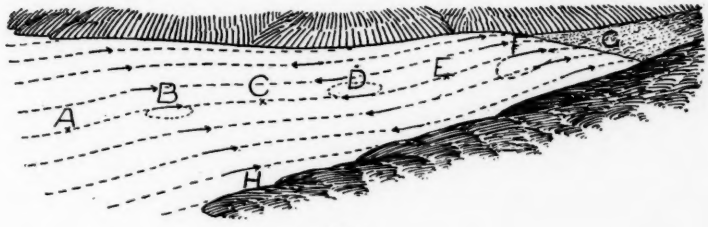

Fig. 1.

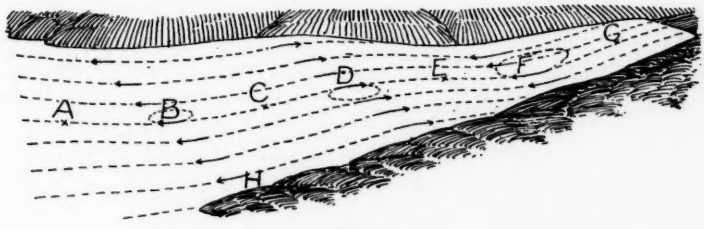

Fig. 2.

greater dimensions horizontally than vertically, as it should be for the illustration here intended.

Now in order to translate these wave phenomena into tidal phenomena, we must imagine ourselves reduced to very small dimensions, so that if we should stand at H on the shore of the little cove, it would seem to be a great bay, 50 or 100 miles long. Then, as the crest of a wave passed, as in Figure 1, we should note the occurrence of high water and flood tide together; and afterwards, as in figure 2, the occurrence of low water and of ebb tide together; while between these two observations there would be moments of slack water—that is, of no horizontal current—but of rapidly falling or rising water. Thus the ordinary relations of high and low water, of flood and ebb currents, and of rising and falling slack water are all made clear. It is

important to remember that these relations obtain, as thus exhibited, at most points on the ocean shores.

If we place ourselves at the head of the bay, another and more special relation will be found. There the water rises with flood current from low tide to high tide; and falls with ebb current from high tide to low tide; and the moments of slack water have neither flood nor ebb, neither rise nor fall. But it is evidently only at a bay head that this peculiar and deformed relation can obtain. Everywhere on the ocean shore or on the side of a large bay, like the Chesapeake, where the tidal wave sweeps past the observer's station on the way to some other point, the more normal relation of high tide with flood current, and of low water with ebb current will be observed. Inasmuch as there is a widespread misapprehension on this subject, it is well that it should be cleared up by simple observational means, such as are here suggested.

There are various other peculiar tidal phenomena that may be illustrated in the same miniature fashion, by choosing shore form and wave strength of appropriate relations. If the incoming waves are very gentle, the wave front may advance up the beach at the head of the cove (or bay), without breaking or foaming; and this corresponds to the ordinary condition of tidal rise and fall, causing an advance and recession on the shore. But with stronger waves, the advancing water front at the bay head rolls over itself in a frothy excitement, and the rise of the water as the wave advances is more rapid than the following fall; this illustrates fairly well the phenomena of the tidal bore, such as takes place in the estuary of the Seine in northwestern France, in the Severn estuary at the head of the Bristol channel in England, in the Petitcodiac estuary of the Bay of Fundy, and at various other parts of the world.

If a cove of appropriate form and size be found, the advancing wave may be transformed into a standing wave within the cove; here the crest stands and sinks to the trough, while the inner or bay-head part of the wave simply swings up and down, in such fashion that all parts of the shore line have high water or low water at the same time; this being the condition of the tides in the Bay of Fundy. If slender branches or creeks open from such a cove, they may illustrate the phenomena of the Petitcodiac estuary, just mentioned; they will be suddenly invaded by an advancing and foaming water-front and left empty (except for local drainage) after the tide has slowly receded. An ordinary accompaniment of this sort of tide is a great exaggeration of the tidal range at the head of the bay; the water there is alternately much higher and much lower than the mean water level outside of the bay.

If a cove is found with a very narrow and shallow entrance, then the range of wave (or tide) rise and fall within the bay will be much smaller than outside of the bay; while strong currents, alternately inward and outward, will run through the entrance. In special cases where the entrance has a rocky sill, the alternating tidal currents may assume the peculiar form of rapids or water-falls, now pouring into the bay, now pouring out, as is the case at St. John, New Brunswick.

If a narrow water passage, or "sound," lies behind an island, the waves will reach the sound from two sides; and according to the length, breadth and depth of the water passages that lead to the two ends of the sound, the waves (or tides) arriving there will differ in strength and in phase. If the tides are about alike in strength and phase, the water in the sound will rise and fall, without strong currents in either direction; but if the waves (or tides) reach the sound in opposite phase—high water from one side arriving from one side when low water arrives from the other—then a rushing current will sweep through the sound, back and forth, in its effort to equalize the inequality of the water level; thus are explained the phenomena of Hell Gate, where East river and Long Island sound join, on the eastern side of New York city.

Little exercises of this kind will be found truly entertaining for the teacher at the sea shore. They may be observed also on lake shores, where no true tides are perceptible unless to the most accurate and long continued observations. Indeed nearly all the phenomena here mentioned may be imitated in a tank, in which a continental mass with a specially designed shore line has been constructed of clay or cement, and in which a wooden plunger is raised and lowered in slow rhythm in a little ocean of five or six inches of water. It is my experience that students have not enough opportunity for observational study in connection with the tides, and that perhaps for this reason the phenomena of tides are as a rule so little appreciated and understood.

In this connection reference should be made to a Manual of the Tides by R. A. Harris, which has been published in several parts in the Annual Reports of the Coast and Geodetic Survey for a few years past. The latest number, Part IV B, is in the report for 1904, and consists of a discussion of the "Cotidal Lines of the World." It contains a map of cotidal lines (Fig. 6), which is of particular value in illustrating how completely out of date the cotidal lines as drawn by Whewell now are; not that this need occasion great surprise, for Whewell himself stated, a few years after publishing his original chart, that it was not to be trusted; but that the Whewell chart is still reproduced from time to time in atlases and text-books,

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where it should not have appeared for fifty years past, except as of historical interest.

Reference may be made also to four plates, illustrating the tides in the Bay of Fundy from photographs by Mr. Roland Hayward of Milton, Mass., published in the February number of the National Geographic Magazine for this year. The second pair of views is the best known to me in illustration of great tidal range.[1] The first view of the pair shows the high piles of a pier, rising 40 or 50 feet above low water; the second picture shows the water nearly up to the top of the piles and a good sized steamboat moored to the wharf. Details concerning the tides of the Bay of Fundy may be found in an article by Chalmers in the Annual Report of the Geological Survey of Canada for 1894 (published in 1895), where it is stated that the greatest authentic range of the Fundy tide is 53 feet, at Noel river in Cobequid bay. Hence the old stories of a 70-foot range should be discounted.

FORESTS AND WATER

An apt illustration of the relation between forests and the conservation of water is shown in a recent letter by Clinton Harris, of Nashville, Tenn., printed in *Recreation*. The letter is as follows:

"To illustrate the relationship between forests and water, make a couple of troughs, line one with clay to represent the country denuded of trees, the opposite trough line with sods of grass or moss to represent the forest-clad mountain side, set them on an incline and connect their upper ends with a rough reservoir. Pour a pail of water into this reservoir and there will be a wild rush of water down the clay-lined trough, while the moss and grass-lined one will drip for hours.

"It only needs a little imagination to convert this machine into a forest-clad mountain and one denuded of timber.

"The cloudburst represented by the contents of the bucket of water suddenly poured into the top reservoir is only a dangerous cloudburst on the barren slope. By the use of this simple device you can explain to a child the absolute necessity of preserving the forests upon the watersheds, if we would have continuous running water and not the certainty of flood and drought which are caused by the watersheds being recklessly denuded of timber."—From *Forestry and Irrigation*.

[1] In the text accompanying these views, it is wrongly stated that the second pair was taken *at* Wolfville; it should be *near* Wolfville.

AN OUTLINE OF HOME GEOGRAPHY FOR PATERSON, N. J.

BY EDITH S. GARLICK
Paterson, N. J.

I. PASSAIC VALLEY viewed from the hills of Second Mount overlooking Paterson.
- Ridges of hills on either side.
- Slopes.
  - Direction of.
  - Length.
- River.
  - Its winding course.
  - Location with reference to slopes.
  - Rapids and falls.
- Gap in First Mount showing business section of Paterson.
  - Location of city with reference to slopes and river.

II. PATERSON.
- Founding.
  - Story of founding.
  - Reason for founding.
  - The raceway. Value.
  - The first factory.
    - Kinds of factories.
    - Need of people to work in factories.
      - Needs of these people and what they led to.
        - Homes, good water, stores, churches, schools, etc.
- Growth of Paterson.
  - Evidences of growth.
    - More factories and more kinds.
      - Cotton, locomotives, machine and harness, silk, linen thread, etc., all attracted by the fine water power afforded by river. The machine and harness established to furnish the demands of the cotton, silk and thread factories.
      - The population continued to grow because of the employment afforded by the many factories.
    - More people.
    - More houses.
    - Hence more business of all kinds.

Reasons for growth.
  Water supply.
  Nearness to New York markets.
  Excellent means of communication with other cities.
    Roads.
    Railroads.
    Canal.
  Nearness to farms and their supplies.
  Attractiveness of the locality in that it is
    Healthful,
    Surrounded by beautiful scenery,
    Protected from severity of wind and storm by the hills.
Needs of the people arising with growth of the city.
  Streets and why needed?
    For wagons.
    For people.
    For drainage.
  Care of streets.
    Should be kept in good condition.
      In repair.
      Clean.
      Well lighted.
    How city provides for this.
      Taxes collected.
      Men appointed.
  Bridges—why?
    How provided.
    How cared for.
  Protection.
    From fire.
      Means. Fire department.
      How furnished and supported.
    From disease.
      Means.
        Laws.
        Hospitals.
        Board of Health.
      How supported and furnished.
    From crime.
      Means.

Laws.
Officers.
How furnished and supported.
Places of worship.
How furnished and supported? Why?
Schools.
Public buildings. Why?
City Hall.
Postoffice.
Court house.
Jail.
Institutions for care of
Poor.
Sick.

NOTE—As city grows larger and more thickly settled, the people, more and more, depend upon the farmer for certain supplies which he brings to the city markets. At the same time, the farmer gets from the city stores many things which are necessary to his comfort and livelihood.

Dependence of city upon country for
Foods.
Milk,
Butter,
Cheese,
Poultry,
Eggs,
Grains,
Fruits,
Vegetables,
Meats.
Dependence of country upon city for
Clothing,
Wagons,
Farming implements,
Furniture.
Many other manufactured articles.

NOTE—Besides depending upon the country Paterson also depends upon other cities for many articles and they in turn depend upon her.

Interdependence of Paterson and other cities.
Paterson supplies to other cities
Silk,

Machinery,
Locomotives.
Paterson receives from other cities
Cotton and woolen cloth and cutlery from New England cities.
Fruits, sugar, molasses from Southern cities.
Meats, flour, furniture from the cities of Central States.
Fruits and wine from the Western cities.

LIFE IN THE TEMPERATE FORESTS

In the Temperate forests and the grass lands associated therewith we find the greatest possible variety of industries, varying according to conditions. The industries of this region are almost entirely those that depend upon the animal life and the tree products. The Polar borders of the timber lands are great hunting grounds, where even now large game exists by the thousands. This area is in the Northern Hemisphere the summer hunting ground of the primitive people of the tundra and of the more advanced people who approach the forests from the south. The more southern regions are more especially used by lumbermen and for fishing. The life of these regions is mostly simple, and the men who go into the woods live a rough, hard, and perhaps lonely life, leaving their families in their homes in the more densely occupied regions. Amid such scenes are developed hardiness, quickness of action, resourcefulness and vigor, and from such training came the frontiersmen and trappers who were so important in this country in the eighteenth and nineteenth centuries. The wealth of the forest must be brought to the edge of the forest before it can be made useful. Within the forest barter is practically the only form of trade. On the outskirts of civilization on the edge of the forest towns spring up, often in our own country around the waterfalls where the timber products are changed into marketable timber or made into wood pulp. The falls and rapids in the stream were always important because here the travelers and explorers had to carry their loads of pelts or other wealth over land. Hence the carrying place or carry was the strategic point in the drainage lines, and the drainage lines are always the lines of least resistance for travelers entering an uncleared forest.

GEOGRAPHY IN THE INTERMEDIATE GRADES*

BY WM. CHANDLER BAGLEY
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1. The intermediate grades are a neglected field in educational theory and practice. Primary work has received a great deal of attention, and the upper grades have always been regarded as important; but the intermediate grades have frequently been the junk-pile for worn-out, inefficient teachers, the training ground for the novices, and the only field absolutely untouched by the rejuvenating spirit of modern methods. And yet the intermediate grades cover the most important formative period of the child's life. During this period, the child has more energy at his disposal in proportion to his weight than at any other time, and he has the greatest power to resist fatigue and disease. This is the time when the teacher can do the most for the child once he understands him; but it is also the time when the child is hardest to understand.

The essential mental characteristics of the child at this stage of his development are (1) his dislike for sustained effort, (2) his slight capacity for 'reasoning,' and (3) his marvelous retentiveness both for verbal forms and for vivid pictures. Authorities agree that the child can accomplish a great deal in this period if he is guided by a strong hand. Here, perhaps, more than anywhere else in school work, the teacher has constantly to battle against nature. The passion for change,—the desire 'to do something else,'—is never so strong. But here, too, these natural and primitive desires can be resisted with least injury to the child. In short, this is the period for serious work with plenty of time for rough and ready play—out of school. This is the time for vivid portrayals, for picture lessons, for school excursions; but it is also the time for drill-lessons, for word memorizing,—the time, in brief, for storing up vivid images and for laying the automatic bases of life.

2. In the geography of the intermediate grades, two important phases of the subject are covered: (1) home geography, which is treated mainly by excursions, by careful observation of the home environment and by simple experiments; and (2) the 'first spiral' of world-geography, which is treated by maps, pictures, oral descriptions and books. The latter phase has to do particularly with the use of the smaller or introductory text-book. Our especial problem will be to review briefly the principles that underlie the suc-

* Reprinted from Normal College Bulletin, August, 1904.

cessful use of this text-book and the use of maps, pictures, models, and other supplementary material in connection with it.

3. The *function* of geography in the intermediate grades is primarily to fix facts and to give the child vivid pictures of various parts of the earth's surface. 'Reasoning work,' by which we mean the pointing out of causal relations, is not much in place at this time. Such work is rather the function of the grammar school geography. Here, however, it is not as much *why* as *what;* not so much the reason as the fact. For example, in the intermediate grades, the fact that New York is the largest city in the United States should be firmly impressed; in the upper grades the pupil should discover the reason for the growth of this city.

A great deal of the place and location-geography, now somewhat in disfavor, may profitably be re-introduced into the intermediate grades. A solid foundation of fact is essential to the later reasoning work, and the intermediate grades are the place where facts may be most easily and economically impressed. Memoriter work may become a legitimate and important factor here *after the facts have been vividly portrayed and richly illustrated.* The evil of the older memoriter methods lay in the fact that dependence was placed exclusively on repetition and rote-learning. The evil of the ultra-modern methods lies in the fact that vivid portrayal and detailed illustration are believed to be sufficient and any form of memoriter work a waste of time. Careful experiments have recently demonstrated, however, that verbal repetition greatly increases the 'revival value' of facts that have either been vividly impressed or 'reasoned out.' A compromise between the two extremes is probably the best guide for practice.

4. The *text-book* used in the first spiral should be selected with reference to the function of the course. In general a good text-book for this stage of the work should fulfill the following conditions:

(a) In style it should be descriptive rather than explanatory or expository. For this reason it should *not* be a mere abridgement of the larger geography, as so many of the elementary text-books are. The treatment should be entirely different. The larger book is necessarily concerned with causal relations and a mere compression makes the treatment formal and lifeless. The most important characteristics of a good introductory work are detail and wealth of descriptive illustration.

(b) On the other hand, the text should be systematic and comprehensive; that is, it should treat the various subjects in a definite and fairly complete manner. This is why even the best of the supplementary readers, such as Carpenter's and Johonnot's, are not suitable for texts. They are rich in

description, but they lack system. Their function is to supplement the text, not to replace it.

(c) The text should emphasize particularly the *people* of different countries,—how they live, how they dress, how they amuse themselves, how they work,—rather than industrial and commercial features of a more abstract nature. The child-life of various countries, as well as the plant and animal life, should receive special attention. Even a partial restitution of the old 'curiosity-geography' of Peter Parley and other early writers might not work an evil. This is the wonder-age of childhood and vividness of portrayal may even border on the spectacular without doing a great deal of harm.

(d) Finally and fundamentally, the elementary text-books should be replete with pictorial illustrations which should be used explicitly for purposes of instruction and not merely as means of diversion and amusement.

5. The *use* of the text-book during this period involves one very important difficulty. The elementary geography is the first book that the pupil uses purely and simply as a text. Therefore the teacher has not only to teach geography but also to teach the child how to study,—how to gain experiences through the medium of the printed page. The trouble which the child finds in 'studying' his geography lesson is precisely similar to the trouble which the adult finds in reading a book upon some subject with which he is unfamiliar. It is not sufficient that the child 'know how to read.' He may be able to do this satisfactorily and yet be unable to grasp the thought that the book presents.

This difficulty of 'preparing' the lesson leads in many cases to the use of the smaller geography as a reading-book. The lesson is read in class rather than 'recited,' and this process is sometimes continued throughout the fourth grade. In the writer's opinion, this is bad practice. The geography may contain 'reading-lessons' which may properly be treated in this way, but, in general, the text is designed as a text and as such it is to be prepared and recited upon.

6. It is in the *study-lesson,* then, that there is greatest need for the oversight and direction of the teacher. The statement made by President Hall regarding history is equally applicable to the study of geography: "At least three-fourths of the time spent by a boy of twelve in trying to learn a hard lesson out of a book is time thrown away. Perhaps one-fourth of the time is devoted to more or less desperate and conscientious effort; but the large remaining portion is dwindled away in thinking of the last game of ball and longing for the next game of tag." The problem of the teacher is to overcome this difficulty and eliminate this waste.

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To this end several devices are available. In a great many schools, the main facts of world-geography are developed orally before the child takes up the text-book? This is the policy in the Butte schools; (see *Report of Public Schools,* Butte, Mont., 1903-04, pp. 153-154.) The oral work in world-geography follows the oral work in home geography and precedes the book. The advantage of this plan is that the first part of the book work covers a field with which the children are already familiar.

Another plan is to take up the book immediately after finishing the home geography, using the oral methods, however, to introduce each lesson. That is, the material of the lesson is worked over in class before the book is touched, then the same lesson is studied by the pupils at their seats, and finally a recitation is made upon the text. In this way, the pupil becomes familiar with the thought and hence is enabled to read the text intelligently. In this way, too, certain points of interest may be raised concerning the subject-matter which the pupil may be anxious to amplify from a study of the text. Thus he will have a motive for that application without which the study-lesson is likely to be a mere mumbling of words.

7. Either of these methods may be employed to facilitate the pupil's introduction to the art of study. In either case, however, the introductory oral work must sooner or later give place to a more independent use of the text by the pupil. In what manner shall this later phase of the work be treated in order to involve as little waste of time as possible?

Let us examine, in the first place, the difficulties that confront the teacher at this point. Assuming that the pupil knows something of the subject-matter (and it is idle folly to set a child at a book-lesson if this is not the case,) it is still true that he will frequently, even under the most favorable conditions, find it difficult to hold his mind closely to the reading. Attention is a rhythmic process. Whatever appeals to the attention must correspond in some measure to the 'rise, poise, fall' of the attention-wave. In oral instruction, this condition is easily fulfilled. By modulation of the voice, by facial expression, by gestures, we may emphasize the salient points and minimize those that are less important. The material of the text-book, however, —even at its best,—is more or less upon the same 'level.' It is an aggregate rather than an organized unity. Its perusal, therefore, becomes monotonous, and attention avoids monotony as nature avoids a vacuum. How, then, may the salient features of the text be so emphasized as to relieve this monotony and introduce a useful variety?

(a) It is customary among the best teachers to bestow not a little care upon the assignment of a book-lesson, and in the course of this assignment to point out very explicitly the features that the lesson is intended to emphasize.

This is an excellent practice and one that cannot be too faithfully cultivated; but even a skillful assignment is hardly enough to insure maximal success. Some method must be employed to keep the pupil's mind constantly returning to these salient points.

To this end, questions written upon the blackboard and covering the essential features of the lesson are extremely useful. These questions should be based upon the text and so framed as to admit of answer only after a study of a certain portion of the text. Such questions may then be used in the recitation, although they should, of course, be supplemented by others of a more detailed nature.

(b) As the pupil becomes more and more familiar with technical terms and fundamental conceptions, the questions may be replaced by *topical outlines* covering the matter of the text, and these in turn may form the basis of a topical recitation. These should be a gradual outgrowth of the questions and made very full and detailed at the start, gradually becoming more and more schematic as the pupil becomes practised in their use. Some of the smaller geographies have such outlines appended to each chapter. That the pupils seldom use them is due to the fact that they have never been trained in such use.

(c) A third device may be profitably employed in connection with those just mentioned. The pupils may be encouraged to make occasional lists of questions for themselves, covering the material of the text. The pupil submitting the best list may then be permitted to 'quiz' the class,—to turn teacher for the time being. This gives the child a motive for reading the text carefully and searching out its important points. Indeed, it is so successful a device that teachers who employ it are often tempted to carry it too far. The pupils come to look, not for the important points, but for obscure details which may be overlooked by their fellows. Like all devices that call into function the powerful instinct of emulation, it must be handled judiciously if it is not to defeat its own purpose.

(d) Growing out of this device is a fourth and final,—leading the pupil to make for himself an outline of the text assigned. This is an art to the cultivation of which we pay altogether too little attention in our present-day methods. If the child acquires what might be termed the 'outing habit' early in life, he will, in course of time, acquire the ability to make a serviceable outline without resorting to pencil or paper,—holding his attention over a long series of topics without undue exertion. He will no longer read, as many of us do, even in adult life, following the words faithfully with the eye, while the wits go wool-gathering. Such a mastery of the art of study involves, of course, a great deal of hard work on the part of both teacher and

pupil. Moreover the road has to be traversed anew for every subject that is taken up; for we cannot think of a 'generalized habit' of study any more than we can think of a generalized habit of cleanliness or industry. All habits are specific; but we can have ideas and ideals as to the best methods of study, and these will be only strengthened by persistent practice in various fields.

8. The elementary text-book should be the central feature of the first spiral in geography, but the work should by no means be limited to the text. The *supplementary readers* which are now available in great abundance should form an integral part of the course, and the fourth and fifth grades should be supplied with at least two sets of these readers.

Whatever supplementary reader is used, great care should be taken to correlate the material with the text. If the class is studying South America, for example, it would be absurd to use Carpenter's *Asia* for supplementary purposes. A definite period should be assigned for the supplementary reading. This should be taken preferably from the time allotted to reading as such rather than from the time allotted to geography. If five periods a week are devoted to reading, two of these may well be given to the geographical supplements.

9. Aside from the geographical supplements used in the class-room, the *home reading* of the pupils may profitably be correlated with the work in geography. There are a number of excellent books of travel and exploration that are written in a style adapted to children. In districts that do not enjoy the advantages of a public library, some of these should find a place in the school library. The series written by Knox and by Scudder, although belonging to the last generation, are still acceptable. Even Jacob Abbott's books of travel for children, belonging to a still more remote period, have a certain charm that will insure their survival. Of modern books, there is a wealth of good material to choose from. One in particular may be recommended,—Frank T. Bullen's *Cruise of the Cachalot*,—a book that should have a place in every school library. In general, books of travel that are written in the narrative or 'story' form will appeal more strongly to children of this age than those that are merely descriptive.

10. The use of *pictures* to supplement verbal instruction is of paramount importance in the first spiral. The child is still in the period of concrete thought. He is, it is true, slowly emerging into the conceptual stage, but the concrete is still uppermost and should be appealed to constantly in the work of the school. As already indicated, the pictures that appear in the text-books should be used explicitly for purposes of instruction and not as means of diversion or amusement. For example, in studying the southern

states, the pupil may chance upon a cut representing the levee at New Orleans. This picture typifies the commercial life of this important port, and if the teacher and his pupils were upon the levee actually watching this scene, the situation would undoubtedly be turned to educative account. The children would inquire about the great bales of cotton,—where they came from, where they were going, what was to be done with them. They would note the contrast between the river steamboats and the ocean steamers and ask why the former were so different from the latter in shape and size and means of propulsion. They would be curious to know why the bales were packed on the decks of the steamboats instead of being stored away in the holds as in the case of the steamers. The teacher would then explain the difference between ocean and river navigation,—the need for small, light-draught craft for the former and the need for large, deep, well-protected hulls for the latter,—the difference between paddle-wheels and screw-propellers, and why the latter are suitable for the steamer but unsuitable for the steamboat. The necessity for trans-shipment, which is the keynote of the growth of trade centers, would then be far clearer to the pupils than a week of formal instruction could make it. Now the picture that represents this scene may be used in precisely the same manner. It lacks, it is true, the life, the movement, the never-ceasing change and diversity of the real situation, but these may be compensated in some measure by the interest and enthusiasm that the teacher can put into the picture-lesson.

In some of the larger cities, the *lantern-lesson* has become an integral part of the geographical instruction. Each school has a small stereopticon (a serviceable lantern may be purchased for fifty dollars) and several sets of slides representing all phases of geographical work are kept at a central office. These are catalogued with a full description of each slide. If the teacher in the fourth or fifth grade wishes to give a lantern-lesson he consults the catalogue to find the slides that are available and the subjects treated by each. These are then distributed among the members of the class, each member being given one or more topics to work up. The pupils find from their geographies, their supplementary readers, their reference books all the information possible concerning the several topics. Each pupil then puts his material in brief form and on the day of the lantern-lesson, he 'lectures' to his fellow-pupils for two or three minutes upon the picture which has fallen to his lot for description. In this way, the pupils have a very powerful motive for gathering information and putting it in good shape. Needless to say, a lantern-lesson that does not involve this activity of the pupils is of slight value as an educative agency, however entertaining

it may be. Pictures, like travel, avail but little if only the passive attention is appealed to.

While the lantern-lesson is probably out of the question for the majority of schools, the principle that conditions its success may be applied to the treatment of other than lantern pictures. Every fourth and fifth grade room should have a number of portfolios of pictures illustrating various phases of geographical instruction. In this day of cheap magazines, such illustrations can be collected without cost. They should be mounted on large cards of uniform size, appropriately labeled and filed away. They may then be employed as in the lantern-lesson, by having each pupil work up a picture for explanation on the day assigned for the lesson. It is hardly necessary to say that the force of the picture or lantern-lesson would be greatly diminished by too frequent application. One of the strong points of the device is its novelty, and this can be preserved only by temperate use.

11. We have said that the period covered by the intermediate grades is the most favorable time for impressing vivid pictures. This means, among other things, that the *map study* of the first spiral is extremely important. This is the time to give the pupil accurate map-pictures. He should be able to visualize maps,—to see the details and form-relations in his 'mind's eye.' In a former paper on home geography, some suggestions were given for making map-study meaningful to the child. The general procedure there laid down may be profitably continued throughout the intermediate grades. The map is a *symbol,* and the intelligent use of symbols always depends upon *a gradual process of condensation and abstraction from the objects symbolized.* If this process has not been carried out faithfully, the use of symbols becomes mere formalism. This danger is to be combatted most strenuously in the teaching of arithmetic, but it is not to be overlooked in geography. The map may easily become simply a complex of colored spaces, interlaced with lines and sprinkled with dots and letters. The pupil may acquire the art of juggling very successfully with maps, just as he may juggle with figures, without having the slightest conception of their meaning.

If the pupil has passed faithfully through the initial stages of map-study, however,—modeling land-features found in his immediate environment, reducing these by scale to map-form, modeling land-features from maps of regions that he has not seen, etc.,—he is quite ready for an intelligent and intensive study of maps in connection with world-geography. The first study of any geographical unit should be a map-study. Everything that can be gained from the map should be noted before the text is consulted. The latitude and longitude of the region, the surface, the drainage, the coast-line features, the relations to other bodies of land and water, should be worked

out by the pupils from the map and impressed as facts. The deduction from these physiographical data should not be unduly pressed at this time. That is to say, the method of inference which is applied so profitably in the upper grades is not now in place. The writer has attempted to employ in the fifth grade the same methods that are employed with great success in the seventh grade and he has found, almost without exception, that the pupils fail to respond with any degree of enthusiasm. They may perhaps make such simple inferences as climate from latitude, commercial advantages from coast line and surface, etc., but the accurate inferences involving the more difficult principles of prevailing winds, moisture, ocean-currents, and the like, should be left for later development. In short this is the time for facts rather than principles, and the purpose of map-study in these grades should be to furnish the child with a definite and accurate picture of the various regions studied.

To this end, the memorizing of boundaries may be helpful if prosecuted temperately; also the memorizing of 'capitals and largest cities' and their locations, the rivers belonging to certain continental slopes and water-sheds, the chief capes, peninsulas and head lands, and particularly the names of states and countries in some definite and uniform order. This may seem decidedly reactionary to those who have come to believe that memoriter work is useless drudgery and entirely out of place in the school. But, as we have already pointed out, experiment has proved that verbal repetition will help materially in the retention and recall of experiences that have been fixed either by vivid portrayal or by processes of reasoning; and it is the writer's experience that the unsatisfactory results that we meet in the grammar school geography must be laid at the door of loose methods and especially of inadequate memory-drills in the intermediate grades.

12. *Map-drawing* is necessarily an important phase of this part of the course. The test of an adequate mental picture of the map is the ability to sketch the map quickly and accurately. Many teachers make a practice of sending a few pupils to the blackboard at the beginning of every geography lesson to sketch in a brief period,—say one or two minutes,—the main features of whatever region may be under discussion. Retention and recall are both improved by expression and the more numerous the channels of expression, the greater the advantage from the standpoint of memory. The results will be extremely crude at first but with practice under careful criticism, they will show a rapid improvement and at the end of three or four months of persistent, painstaking work, it is remarkable what the pupils can do in the way of map-sketching. One or two introductory lessons may perhaps be given in the copying of maps from the book, but this

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should be reduced to a minimum; it is the free-hand sketching from memory that is the most beneficial. The finer work will come later in the upper grades, where the principles of projection should be carefully developed and maps constructed in a nice degree of accuracy.

The making of *progressive maps* is also in place in the intermediate grades. The outlines should be preferably drawn by the pupils themselves, although there is no great harm in using the lithographed outlines occasionally. The use of outline wall-maps is likewise to be commended. A good set of relief maps and a relief globe are almost indispensable to the development of adequate ideas of surface features. The objection that has been raised against relief maps and globes on the ground of the exaggerated scales that they employ is not, in the writer's opinion, valid from the educational standpoint. While a relief map of Asia may exaggerate the height of the Himalaya Mountains from the standpoint of absolute truth, the height cannot be exaggerated if we consider these mountains as impediments to human intercourse. They are effectual barriers between two different regions and, as such, their absolute height might be multiplied ninety or nine hundred times without doing violence to one's conception of them as barriers; and this, we take it, is the proper geographical conception.

SOME RESULTS OF GEOGRAPHY TEACHING

Of all elementary studies geography best affords opportunity for training pupils to *right habits of studying books.* During three school years the pupil "learns to read"; in the fourth grade he uses a text-book in geography and "reads to learn" about the world. He should be taught and accustomed to the systematic study of pictures, maps, and text, with a view to the ready and orderly expression of the knowledge gained. Through such a strenuous course the teacher must yet aim to conduct the work so that the pupil shall leave the elementary school with a *desire to continue* the study of the world and its peoples. Pupils should become accustomed to use the public library wisely to this end. Ably directed and enthusiastic study of the geography of our city, of the United States, and of the world may secure the highest ends, the development of broad *patriotism*—active love for our city, for the nation, for humanity.—From *Course of Study in Geography,* Lynn, Mass.

EDITORIALS

FIELD EXCURSIONS IN SCHOOL GEOGRAPHY

THE opening of the school year is an opportune time for again emphasizing the advisability and possibility of incorporating excursions in elementary school geography work. Excursions to study industries in operation can in many localities be conducted at any season but excursions to study field phenomena or such industries as are carried on out of doors are necessarily restricted in time to the open season in autumn and spring.

No argument is necessary to show that excursions are absolutely necessary in association with the class room study of the surface features of the earth—no matter in what school year these features are taken up. The mere word and picture study of the forms of land and water is better than nothing but children can only secure valuable results of permanent worth when their study is based largely on the personal observation of facts. Inexperienced children cannot read aright the pictures of phenomena they have never seen, and imaginative children are liable to get grossly exaggerated erroneous conceptions from unreal geography.

Excursions may be for two objects,—as one teacher has well expressed it, many excursions with mature pupils should be for field work—that is, for the purpose of studying first hand subjects that are new, and which are presented first in actuality.

Other excursions may be for "field sight,"—that is, for the purpose of illustrating subjects and relationships already taken up in the class room. The method of conducting excursions naturally depends upon the object for which they are planned and varies with different localities and topics of study.

No one should be prevented from conducting excursions because of inexperience in this work, for the difficulties are not so great as is usually anticipated. Of course the teacher should know the ground thoroughly, should know how it can be reached and should have the mechanical side of the excursion thoroughly planned beforehand so that it will move like a series of army maneuvres.

The chief difficulty to be encountered is due to the fact that the public is not accustomed to seeing children at work out of doors. Hence the usual gathering of "camp followers" who make comments and distract the attention of the pupils. In Switzerland and some other countries of Europe excursions of school children are so familiar to the public that no one pays any attention to a group of children at work out of doors. Excursions

are approved by the authorities and by the parents and are welcomed by pupils and adults.

By keeping continually at it the public will soon approve school excursions in this country. Hence the advantage of carrying on excursions systematically.

No locality is too poor in geographical phenomena to be exempt from excursions and no teacher of geography should hesitate to take advantages of the opportunities of her vicinity. The autumn is a splendid season to begin excursion work and the more excursions the better, provided they are systematically planned and distinct contributions to school work. No excursion should be merely a picnic, and yet class room discipline should not be maintained when the class is on the move between one locality and another. Neither should inattention be allowed when the class is facing the object of the excursion. A rational combination of freedom and class discipline will make the excursion a success and at the same time a sufficient change from class room work to be enjoyed by all engaged in it.

GEOGRAPHY IN THE INTERMEDIATE GRADES

Attention is particularly called to the article in this number on Geography in the Intermediate Grades. As the author accurately states, no phase of school geography teaching is so poor as that in the Intermediate Grades. The work for beginners has been revolutionized and vastly improved within the last few years. Geography in the upper grades has been on a higher and better plane for a decade, but the intermediate work is still, as a rule, much the same as it was twenty years ago. How to teach geography as well as children, how to give training in studying the subject, as well as an elementary knowledge of the subject, without merely doing in an abridged way what is to be done more thoroughly in the later grades, is a serious problem.

Courses of study are particularly weak in this phase of the work, and no "method" has been devised that solves the problem. Indeed, it is not a new method that is wanted but a better ability on the part of teachers to organize human geography and lead the pupil from the home to the world without any violent break in the ways of presenting the materials.

REVIEWS*

THE four volumes of the Philippine census bring together for the first time "complete returns of the population and resources of the archipelago." They therefore form the first source of reference for general and special information in reference to the Philippines.

The first volume is devoted to the geography, history and population of the Philippines and includes an excellent summary account of the physical formation, climate, volcanoes and earthquakes, elevations, islands, discovery and progress, the judiciary, history of the population, characteristics of the civilized or Christian tribes, and of the non-civilized tribes. Illustrations and maps are numerous and valuable. The chapters dealing with the different tribes give an excellent account of the physical, social and mental characteristics of the peoples and their method of life. This volume is the most generally useful of the series.

The volumes on population and mortality, defective classes, education, families and dwellings are almost wholly statistical, after the general plan of similar reports in reference to the United States. Volume Four deals with agriculture, social and industrial statistics, and contains a mass of detailed statistics. The earlier part of the volume contains a detailed account of the products, their distribution, cultivation and harvesting. The volume is well illustrated with pictures showing the processes of the varied industries and is very effective. This volume and Volume One are the most generally useful to the lay reader, while Volumes Two and Three will be of service mainly to the special student of selected problems. R. E. D.

The second edition of Gannett's Origin of Certain Place Names in the United States is an extremely interesting Bulletin of great help in giving vitality to certain phases of local geography. The relation between local names and history is clearly indicated, as the following example will indicate:—Vineyard Haven; town in Dukes County, Massachusetts, so named because of the quantity of vines found on the island at the time of discovery. Haven from the harbor or haven on which the village is situated.

*Census of the Philippine Islands, 1903, in Four Volumes. United States Bureau of the Census, Washington, 1905.

*The Origin of Certain Place Names in the United States, by Henry Gannett, Bulletin 258, U. S. Geological Survey.

NOTES

ORGANIZATION IN SCHOOL GEOGRAPHY.—"When I was fourteen or fifteen he taught me to place my knowledge as it came, to have its proportion. He so kept me to the drawing of maps that the earth has ever since lain beneath me, as if I could see it all from a great height, and so taught me history that I see it now as a panorama, from the first days. In his time I could draw the coasts of all the world in very fair proportion, without looking at a map, and I think I could do it now, though not so well as then perhaps."

The above quotation from a letter written by Burne-Jones forty-five years after the occurrence of the school experiences he describes is suggestive to those who are interested in geography teaching. There is no subject which requires more definite planning for there is such a range of detail which presses upon the attention and which, from the standpoint of interest, justifies consideration. But here as elsewhere a careful plan is required, not, for the sake of the plan, but from the fact that only if the central scheme is well in mind can the teacher feel free to reach out into the inviting fields which present themselves.

I have often wished that some one would formulate that part of geography which has survived in the consciousness of men of fair range of activities. I would by no means advocate cramming children with a skeleton of this material but a good teacher, with this in mind, could plan so that the substance of that which will prove useful would be used for several years in succession and thus it would come under the pupil's control. During these years he could roam through any amount of the material in our excellent modern geographies, books of travel, guide books, railroad folders, etc., but a certain scheme of outline maps, surface maps, product maps,—whatever proves worth while, would give him a center to which this large range would have constant reference.

I visited a third grade in a neighboring city recently and found that the teacher had hurried through the course of study in geography early in the year and had then set out to help the children to formulate such a geography as suited their needs. Rather against her wishes I sent the children to the board. "They haven't been drilled or tested on any of this work," she told me. But I insisted and I found that what they had brought together they had used and they had it under control. Whether I took up their own state, the United States, any continent, or a hemisphere, it meant something definite and, best of all, it meant in each case a few things well understood. I told her when I left the room that the strongest part of her work was shown

in her judgment in knowing what to leave out. I do not wish to have children of that age, in schools in which there is an opportunity for more industrial handwork, do as much as those pupils had done in geography, but in that school it was the most concrete part of the curriculum and was well used.

Geography is pressed hard by nature study on one side and history on the other and its relations to all the other branches (we might almost call them twigs for their number) of study are evident. All the more reason that we take care to respect the personality of the subject and make it more than a handmaid to the rest of the curriculum. Some day we shall see this clearly enough to give it, apart from the occasional term assigned to geology, physiography, commercial geography, a place in the secondary school curriculum second to no other subject in importance. The increasing respect it is receiving in the colleges will help to bring this about.—F. A. Manny, Ethical Culture School, New York City.

A Method of Conducting Field Trips.—Teachers often find that field trips do not accomplish as much as is expected, and they are led to ask: "Considering the amount of extra work involved and the strain upon the teacher, do field trips pay?" This, of course, depends upon how much the pupils get out of the trips. After trying several plans, I have settled down upon this one: (1) Select a rather limited territory to be covered. (2) Select a definite topic to be studied. (3) Hold the class to this topic and study it in detail. (4) Prepare a list of questions which shall direct the pupils in their observation and have a copy of the questions in the hands of each pupil.

Following is such a list of questions prepared for use in the Trenton, N. J. schools. They are designed for sixth, seventh, or eighth grade classes. Four thousand copies were printed and distributed among the schools.

Two or three trips of an hour each, or one longer trip, are necessary to do the work covered by this set of questions.

Field Excursion in Geography.—Place—Cadwalader Park, North Side. Topic: The Work of Streams.—1. Study the stream from the lake to the culvert under the canal, watching for examples of (a) erosion, (b) transportation, (c) deposition.

2. Discover places where the stream is aggrading its bed; degrading it. Decide whether or not the stream has yet reduced its course to grade. Reasons.

3. Find various evidences that the stream is doing work. What are some of the evidences?

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4. Sometimes the stream does more work than it is now doing. When? Why?

5. Why are there large stones in some parts of the stream-bed and fine mud in others, and only bare rock in others?

6. Find examples of the following: (a) flood plain, (b) rapids, (c) falls, (d) young valley, or gorge, (e) mature valley (broad, with gently sloping sides), (f) lakes.

7. Why does the valley get wider as it gets older? How do we know that a gorge is a young valley?

8. What causes the lake in this stream? Aside from the lake caused by the dam, is there any other lake in the stream-course? Cause? Why is it likely to disappear?

9. How might a lake of considerable size be formed in this valley? How might several small lakes be formed? Mention two ways by which lakes are caused to disappear.

10. Why does the stream flow more swiftly in some parts than in others? Is it doing more work in such places? Explain.

11. Explain in detail how a stream deepens its bed; widens it; forms flood plains; grades its course.

12. What causes the water-falls? Are they of the "step falls" or of the cataract type? Why will they change slowly from year to year? Why will they "move up stream?" Do all falls tend to move up stream? Explain. How about Niagara?

13. Does this stream appear to be carrying much waste, or sediment? May it sometimes carry more than it does now? Explain.

14. What caused the valley in which the stream flows? Is the valley becoming deeper? Wider? Explain. What becomes of the waste washed away by this stream? Are other streams doing the same?

15. Whence comes the water which supplies this stream? Why does it flow even long after a rain? Why does water flow down hill?

16. What do we mean by "water power?" Are there any places on this stream where water power might be utilized? Explain.

17. Imagine this brook to be increased in length, width and volume until it became as large as the Delaware, yet retaining exactly the same features (enlarged) that it now has. Considering the mouth of the river to be at a place where the teacher will indicate. Then, (a) where is the navigable portion of the river? (b) The head of navigation? (c) The fall line? (d) At what place do you think the chief city of the valley would spring up? (e) The second largest city? (f) smaller manufacturing towns? (g) Summer resorts? (h) Where would bridges probably be built?

Give reasons for each answer.

18. Basing your conclusions upon what you have observed in connection with this stream and others, formulate five or six *general principles of stream action,* such, for example, as:

1. Streams erode where they flow swiftly and deposit where they flow slowly.

2. Streams transport sediment from the higher lands to or toward the sea.

R. H. W.

CONCERNING GEOGRAPHY TEACHING.—Granting that geography shall in a general way be a study of the earth as the home of man, and thus be made to include somewhat of history, of government, of religion, of trade and commerce and industries, of the fauna and flora of the several political divisions of earth as studied, it likewise holds true here as in all matter selected for school instruction—some parts are educationally of greater importance than others; some ways of presenting the same subject-matter to pupils are far more productive than others of good results in mental growth and ability. Supplementary reading concerning distant places and nations, the narratives of travel and of exploration have their important place with geography teaching; but it is ever to be remembered that this place is strictly secondary, designed largely to extend the range and to make application of the class instruction as time and facilities at hand shall permit.

Geography as a life-long study may well leave to later years much information now crowded upon the inexperience and the indifference of the grammar school age, while the fuller comprehension of our portion of the earth as our home—its phenomena of air and water and soil—is under no plea or excuse to be neglected or omitted. In geography as commonly taught the facts of environment have very largely been relegated to a term of so-called Physical Geography, and left for the ninth grade in the high school or omitted entirely from the curriculum, and this, notwithstanding such facts and phenomena used day by day and grade by grade stand unrivalled as means to stimulate thought, provoke inquiry and lead to a mastery of the surroundings of life.

LABORATORY WORK IN GEOGRAPHY.—In urging that the teaching of geography be so modified that it becomes indeed an integral part of a continuous line of science work, even as arithmetic is for mathematics, or grammar and composition is for the English work, the vital point is after all not so much one of subject-matter to be presented as it is a question of how the facts constituting the usual stock of geographical knowledge shall be acquired—the manner of their use in training to mental development. It is

not of supreme importance that the texts in geography contain matter that were better assigned as supplementary reading or omitted altogether; nor is it the case that the facts and phenomena of the environment of the children generally are not set forth in the texts in geography in common use in the schools to-day. And it may be said right here that some of these modern texts are in most respects marvels of progress in teaching, and in the hands of teachers trained in the ways and spirit of modern methods leave little to be desired. Nevertheless, in all these books geography is made subjective, and it is the book that is studied rather than the forms and phenomena of earth. The geography text of to-day is a most fascinating story, with its superb maps and illustrations, as it tells of man's home and man's doings. Reading into it the broader experiences of the more mature mind, it seems to have attained the acme of perfection; but, withal, its subjective treatment of the topics of geography, as commonly taught in the schools, puts the geography too largely upon the same basis as the supplementary geographical readers, the narratives of travel and of exploration, and, divorced as it is from the concrete forms of nature, there is in it to the child mind altogether too much of the element of the "Once upon a time" story.

The mere facts of earth study, even if the pupils were to become in the years of their school life veritable encyclopedias of geographical knowledge, are relatively of far less importance than the training that comes from the objective study of the same topics—a training that does not stop with an intelligent comprehension of nature's ways and of man's adaptation thereto, but enables the pupil as well to put to all his relations of later life the same rigid requirements in getting at the truth of things, and the same reasoning processes as required in his laboratory science whereby conclusions are based upon facts rather than "jumped at."

No Time for Laboratory Work.—The plea for laboratory work in connection with geography teaching affirms (1) that it is better that the children be required to note with care and to make study first hand of the forms and phenomena of earth rather than to read only about them in books; (2) that it is better to know more of the causes of the natural phenomena about them and less of distant lands and peoples; (3) that it is better to master enough of the particulars of environment whence to reason to general conditions prevailing around home and elsewhere than to begin with general statements, and that pictures and various forms of illustration shall be used to lead up to the general concept rather than for deductive study; (4) that to be spared the time and effort required in a mastery inductively while in school of the common facts of the natural environment is to be short that

much in a preparation for later life where every person must repeatedly and in all manner of affairs reason inductively to conclusions based upon the facts in possession, by which conclusions the course of life is ordered; (5) that so far as the geography is part of a course in science this simple concrete nature work makes possible as no other means can the amount and character of science work properly expected to be done in the high school.

THE HUMAN ELEMENT IN GEOGRAPHY.—That no misunderstanding arise in thus urging at length the science phase of the teaching of geography, both from what has already been said and from the type lessons to follow, there is need at this point to note that the study of geography is unlike the science studies of the high school in the strikingly important feature that every fact and every relation is viewed and its relative importance determined by reference to man's existence, his interests and activities. From the individual as a center with an ever widening range of inquiry and mastery, the studies in geography reach out in all directions and into all fields of human interest and of human effort, including not only the beginnings of the various sciences but as well history, government, sociology, together with much of trade and commerce and the different industries in which man engages and which contribute to his happiness, his comfort and his progress in civilization. Indeed, attention may well be called to the fact that not only does geography give to history its place realities and, through its surface and climatic conditions, play a leading part in the history of the race, but in the very training herein advocated through the study of natural features and conditions brings to the advanced history study the ability to see the relations of facts historical, and to reach conclusions for one's self based upon such facts, demanding of the historian of the past as of the writer of current history that he give the facts in full, allowing the reader to come to opinions of his own.

It may be added further that so fully have these relations been recognized and met in the modern geography text with its admirable lines of supplementary reading that it is in the science phases almost exclusively that there has been lack of progress commensurate with their importance, and that progress in these other phases has not always been free from encroachment upon the time allotment for elementary science.

SOME TYPE LESSONS IN GEOGRAPHY.—These type lessons in laboratory work in geography, together with the lists of books and of supplies, were prepared as part of a report on modifications in geography teaching made to the Physical Science Section of the State Teachers' Association at its meeting

in Omaha, December 28-30, 1904. Their purpose and place in the teaching of geography can be set forth in the following general statements:

(1) The work in geography is planned to extend into or through the ninth grade.

(2) The teacher and pupil shall spend much time and much stress is to be laid upon the forms and phenomena of earth and air and water—the common environment of all, and these shall be dealt with objectively from the outset rather than by reading about them. The intent is that from the beginning there is sought an intelligent comprehension of local conditions, including those phases of elementary physical science therein presented.

(3) In connection with and supplementing such work at its earlier stages there shall be used a beginner's book on Home Geography. Such book should be one whose wisely chosen pictures serve for studies as well as for illustration, setting forth clearly the conditions discussed as the same may be observed in the locality pictured. The connected narrative serves as a backbone to which to articulate all experimental and field work, preventing it from becoming disjointed and fragmentary, serving as well to enable the pupil to pass from an understanding of things of the immediate neighborhood to other regions presenting like phenomena and type forms.

(4) A distinction is to be made between Home Geography as a text in the hands of the pupils, and any supplementary and reference books for the geography work with which the school library shall be supplied. A selected few of such books are named in connection with these lessons.

(5) The experimental work not only enriches the geography teaching by making the earth studies very real, partaking in some large degree of the life experiences of those taught, but the pupils are at the same time being trained through the geography work into all the advantages of a connected continuous course in elementary science. Herein lies a practical solution of the vexed problem of nature study for the graded and rural schools.

(6) Further, it solves the all important problem of how there shall be provided for the pupils who never reach the high school some considerable of the facts of elementary science and of the training gained therewith, making possible as well in the high school the science work demanded there.

(7) A laboratory course carried into the ninth grade makes possible under guidance the study and interpretation of forms shown on topographic and relief maps, obtained for and kept as part of the supplies for teaching geography.—From *Nebraska State Normal School Bulletin,* April, 1905.

Salt Harvesting on Great Salt Lake.—In some respects the salt industry of Utah is of peculiar interest and picturesqueness, and a trip out to the salt-works at Saltair would well repay any visitor to Salt Lake City.

For the first few years the salt was obtained from the evaporation, during the summer, of the water contained in little lagoons or natural basins along the shore of the lake. The early settlers were supplied in this crude way until about 1860, when some one conceived the idea of building earthen dams in low places along the shore of the lake, which would hold back large quantities of water for evaporation.

If the lake water were evaporated just as it is pumped in, a number of undesirable impurities would be precipitated along with the salt. To avoid this, the water is passed through a series of ponds. The first of these is a large "stock" or "settling" pond, around which are grouped a series of shallow "harvesting" ponds, each about eight hundred feet wide and one thousand feet long. About May 1 the stock pond is pumped full of water from the lake, and this is allowed to stand until the iron and most other impurities have settled to the bottom as a reddish precipitate. The water is then permitted to flow into the harvesting ponds, which are usually kept about six inches deep in brine. In an ordinary hot season the water will evaporate at the rate of about two inches a day, and this loss is made up from the stock pond, which in turn is kept full by pumping direct from the lake. A further purification is effected by the fact that one of the principal impurities contained in the brine, sodium sulphate, floats when formed, and is driven to the leeward sides of the ponds. The product from these parts is therefore impure, and is marketed for cattle and silvermill use, while that from the rest of the ponds is very pure salt and is sent to the mill for further refining.

Until about September 1 the ponds are kept full of water, after which time pumping stops and the ponds are allowed to evaporate almost to dryness. They are not permitted to evaporate completely, for the last inch or so of brine contains impurities, and is therefore drained back into the lake. During the progress of this evaporation, the brine has deposited a layer of salt on the tanks. In average seasons this layer is about three inches thick, though as much as six inches has been obtained in particularly favorable (*i. e.*, hot) years.

After evaporation has emptied the ponds, the salt is ready for harvesting. It shows as an intensely white, level surface, glistening in the sun like a snowfield. Part of it is fine grained, but most is in the form of large crystals. Harvesting is commenced by shoveling the salt up into wheelbarrows, after the crust has been broken by plows. The crude salt is then heaped up into large stacks, and allowed to stand until needed. Rain has only the effect of purifying it, as the more soluble impurities are readily washed off the stacks while the more resistant salt is left.—*The World To-Day*, June, 1905.

THE CZAR GRANTS RELIGIOUS FREEDOM.—In Russia proper the expected disorders did not occur, possibly because of the timely Easter proclamation, granting for the first time religious freedom, and remitting $45,000,000 of debts owed by the peasants to the government for advances to the village communes during the recent stringency. In spite of the silence of the ukase on the subject of the Zemsky Sobor, to which all Russia has been eagerly looking, this prospect of liberty of conscience was hailed as the most significant event since the emancipation of the serfs, and the first evidence that the promises of the Christmas rescript would be carried out. The Church dignitaries had contended that religious freedom already existed; but while all religions were tolerated, nobody could leave the Orthodox Church without forfeiting all civil rights: a convert to one of the many sects, for instance, could neither inherit nor own property; and it is stated that hundreds of thousands have been deprived of their belongings and even exiled to Siberia for such changes of belief. The adherents of the "Old Faith" number nearly seventeen millions, and include many of the wealthiest merchants of Moscow; their altars had been sealed up for twenty years, and they had been subjected to unceasing persecution. When the Czar, accepting the statement of the Metropolitan Antonius that "you cannot hold strange children in the Church against their will," abandoned the historic policy of crushing conquered provinces into national unity by a rigid prescription of religion, there was a dramatic scene in Moscow. These "Old Believers" gathered there to celebrate Easter in churches which had been closed for a generation—to find many priceless paintings and relics spoiled by the mold and dampness of years. The decree not only removed the disabilities of all Christian sects, but also gave equal rights to some millions of Mussulmans and Buddhists, who were "to be called pagans no longer." Only the Jews were exempted from the provisions of the act, nothing at all being conceded to them.

The continued anarchy in the Caucasus brought about the appointment of an agrarian commission under M. Goremykin to aid and advise the peasants; but it is admitted that no practical results can follow for months.—From *World's Work,* June, 1905.

THE POWER TO TEST GEOGRAPHIC INFORMATION.—Certain classes of papers and periodicals are so full of geographic inaccuracies and impossibilities that every child should learn from his school geography work how to cull the good from the bad and how to recognize absurdities, no matter how large and glaring the type and how alluring the pictures. All that is set in type is not necessarily accurate or true.